relative to the Y-axis and a valid response requires that both a Y and X indication be provided. With the arrangement illustrated in FIG. 1, the areas defined by the intersections of the loops are the only valid response areas if both an X and Y indication are required thus this circuit provides means for detecting the location of probe P in any one of forty areas defined by the intersections of the loops VL and HL.

The loops may be uniformly spaced, close together or widely separated, or nonuniformly spaced to provide selective response areas on the screen. The arrangement of the loops will be determined by the use to which the particular detection device is to be put.

With this arrangement, areas for printed information may be reserved within which no responses are permitted by simply spacing the loops as desired to display this information. This arrangement provides a programmer unlimited flexibility for limiting responses to selected areas and reserving areas for printed matter on the display screen.

In FIG. 2, a single loop HL*i* is connected to sense amplifier SAY*i* which provides an output on conductor Y*i* when the probe is located within or bracketed by the conductor forming loop HL*i*. When the probe is in this position, it induces currents in both sides of the elongated loop which are additive and of sufficient magnitude to be detected by the sense amplifier SAY*i*. Sense amplifier SAY*i* includes an inductor L1 in series with a capacitor C1 which couples one side of the loop to the base of a transistor T. The other side of the loop is grounded and connected to the emitter of transistor T. Inductor L1 and capacitor C1 are chosen so they are resonant at the frequency of the electromagnetic radiation of probe T. A voltage divider network formed of series connected resistors R1 and R3 between a source +V and ground provides base bias for transistor T. The collector of transistor T is connected to the bias source +V by a load resistor R2 and a capacitor C2 connected between the collector of transistor T and ground provides filtering of the output from the sense amplifier so that a logic level voltage is provided on conductor Y*i*.

Stray electromagnetic fields have little or no effect on sense amplifier SAY*i*. Since the loop HL*i* is elongated, the currents induced in the parallel portions of the loop are not additive, thus the input signal to the base of the transistor T of the sense amplifier SAY*i* is insufficient even when properly phased to turn it on. Furthermore, tuned circuit L1C1 is in all probability tuned to a different frequency. Thus, stray fields have little or no effect and the probe when outside of the loop HL*i*, that is, not between the two elongated portions of the loop has little or no effect even though of the same frequency as the tuned circuit L1Cl.

Probe P shown in greater detail in FIG. 3 includes a body portion 30, a moveable switch actuator 31 which is biased to an inoperative position by a spring 32. When the actuator 31 is brought into physical contact with the screen SC, it moves against spring 32 and closes the contacts of a switch 33 completing a circuit for energizing a radio frequency oscillator 34 which is connected to a coil 35 which provides the alternating field that induces the current previously described. A radial flange 36 extending from the body 30 retains switch actuator 31 within the body 30 and another radial flange 37 extending from body 30, anchors spring 32 which urges switch actuator 31 into the inoperative position. A circumferential enlargement 38 on switch actuator 31 engages flange 36 which retains the actuator 31 within body 30.

The circuit illustrated in FIG. 4 is identical in all respects to the circuit previously described and shown in FIGS. 1 and 2. However the values of L1 and C1 may be altered to provide exclusive responses at all response points for a supervisory probe and limited responses for an operator probe. Inductor capacitor pairs L/C may be turned to one of two different frequencies designated supervisory frequency (LS/CS) and operator frequency (LO/CO). Thus, if responses to a supervisory frequency only is desired at any given Y-coordinate, the sense amplifier connected to the loop H*i* at that coordinate is tuned to the supervisory frequency (LS/CS). If operator and supervisory responses are desired at some Y-coordinate Y*i*–1, the sense amplifier connected to the loop HL*i*–1 is tuned to the operator frequency (LO/CO). The supervisor's probe is provided with two oscillators which provide radio frequency electromagnetic radiation at both frequencies. Whereas the operator's probe is provided with only one oscillator which provides radio frequency electromagnetic radiation at the operator frequency.

With the arrangement illustrated in FIG. 4, the supervisor's probe may detected at any of the response points as indicated by the S at each response point since his probe radiates both the supervisory and operator frequency. The operator probe may be detected at selective points where in O is inserted since his probe only radiates the operator frequency. The above detection system is of course predicated on the fact that a valid detection can only occur when one horizontal and one vertical amplifier detect radiation.

The above described capability is extremely useful where an operator may insert decisions into a computer system by way of a display panel and his decision or authority is limited, however, supervisors or other personnel so designated may insert information or commands at any response point. The availability of probes provided with the dual frequency radiation would be under control of the system management which would be responsible for security and proper use of the supervisory and operator probes.

A variant of the FIG. 4 arrangement may be employed to achieve the same result. According to the variant, the supervisor and operator probes each radiate a single unique frequency and selected sense amplifiers are turned to both frequencies thus responding to both the supervisor and operator probes. The remaining amplifiers are tuned to the supervisor frequency only.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof. It will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

What we claim is:

1. A device for providing positional information relative to an electromagnetic radiating probe when positioned in close proximity to selected locations on a surface comprising:

a first group of spaced electrically independent conductive loops located in a single layer in close proximity to said surface,

a second group of spaced located in a single conductive loops layer in close proximity to said surface and arranged to intersect the first group of loops, said intersections defining a plurality of unique response areas in the said surface,

a first group of sense amplifiers each responsive to one of the loops in the first group of loops for providing an output when the probe is bracketed by the connected loop, and

a second group of sense amplifiers each responsive to one of the loops in the second group of loops for providing an output when the probe is bracketed by the connected loop whereby the probe position can be determined by the sense amplifier outputs when it is located within any of the unique response areas defined by the intersecting loops.

2. A device as set forth in claim 1 in which the loops of the first and second groups are arranged substantially orthogonal to each other and the response areas defined by the intersections of the loops are substantially rectangular in shape.

3. A device as set forth in claim 2 in which the loops of the first and second groups are elongated and are each substantially longer in one direction than the other.

4. A device as set forth in claim 3 in which the sense amplifiers of the first and second groups are tuned to the probe frequency and reject other frequencies.

5. A device as set forth in claim 1 in which the first group of loops are horizontally arranged and the second group of loops are vertically arranged.